WELLHEAD AREA SURVEY
CONTINENTAL MOTOR INN
ACHD SITE NO. 47 & 48
La Vale, Allegany County, Maryland

ALWI Project No. AL7N001

1.0 INTRODUCTION

Advanced Land and Water, Inc. (ALWI) was retained by the Allegany County Health Department (ACHD), to prepare a Wellhead Area Survey for the Continental Motor Inn (Inn), located on the North side of the National Pike (U.S. Route 30) immediately North of Six Mile Road, on the South Side of Braddock Run in western Allegany County, Maryland. The Inn has 40 motel rooms, plus a restaurant and an office. These sites, designated No. 47 & 48 by ACHD, are served by two closely spaced production wells completed in the perched bedrock aquifer.

The draft Maryland Department of the Environment (MDE) "Transient Water Systems Operations Guidance" manual (herein termed the "Guidance Manual") defines a Non-Transient Non-Community (NTNC) Water System as one that "...serves at least 25 regular consumers over 6 months per year." An informal interview with an employee suggested that the regular clientele (300 per day on average in the bar), the year-round operations, and the lack of nearby tourist attractions drawing transient customers all combine to suggest that this water system is indeed a non-transient non-community system (NTNC).

1.1 PURPOSE

The Safe Drinking Water Act (SDWA) of 1974 required the U.S. Environmental Protection Agency (EPA) to develop enforceable drinking water quality standards to protect the public health. In 1986, amendments made to the SDWA strengthened provisions for the protection of underground sources of drinking water. These amendments included provisions for establishing Wellhead Protection Programs by individual states under "umbrella" EPA oversight. The EPA approved a statewide Wellhead Protection Program developed by MDE in June 1991.

The MDE program originally applied to community water supplies, only. A newly proposed broadening of the federal Clean Water Act will have the result of expanding the MDE Wellhead Protection Program to encompass non-community supplies both transient and non-transient in nature. ACHD, in cooperation with MDE, established this program to bring existing non-community supplies into compliance with the coming regulations.

1.2 SCOPE

ALWI prepared this Wellhead Area Survey following ACHD requirements, which followed MDE guidelines for transient system operation and wellhead protection.

1. **Site Reconnaissance and Interview** – ALWI observed the on-site wellhead, storage, treatment, and distribution infrastructure to the degree exposed without excavation or exposure to personal hazards. The owner of the Inn described its history, water use, and other issues potentially germane to wellhead protection.

2. **Baseline Water Quality Assessment** - ALWI purged the water system and collected samples for analysis in the ACHD laboratory that is affiliated with the Maryland Department of Health and Mental Hygiene (DHMH). ALWI performed this fieldwork in accordance with MDE potable water sampling criteria including in-field measurements of turbidity, chlorine, and pH. ACHD selected the analyte list based on countywide experience with potability concerns and the capabilities of the aforementioned laboratory. The analytes included total and fecal coliform bacteria, nitrates, nitrites, iron, sulfur and manganese (Appendix A).

3. **Contamination Hazard Assessment** – ALWI identified existing and potential contaminant hazards within the delineated WHPA based on visual observations and the techniques enumerated above. ALWI ranked these hazards in term of relative risk and provided concrete suggestions for their appropriate address. More generally, herein ALWI provides specific recommendations for source reduction measures, contingency plans, and other methods that may help better protect against occurrences of groundwater contamination.

2.0 HYDROGEOLOGIC FRAMEWORK

ALWI used published information from the United States Geological Survey and the Maryland Geological Survey to identify and describe the characteristics of the local hydrogeologic setting.

2.1 BEDROCK GEOLOGY

The Inn is situated within the Appalachian Valley and Ridge physiographic province and is underlain by rocks of the late Devonian "Catskill Clastic Wedge" (Hampshire formation, Chemung formation, etc.). These rocks have been gently folded, resulting in broad synclines (concave-upward folds) and anticlines (convex-upward folds).

In three dimensions, the local rock formations dip at right angles to the direction of plunge of the fold system. In general, dip directions may help govern groundwater (and contaminant) movement directions in the bedrock but plunge directions have less relation. However, at this location, the bedding planes are nearly horizontal, which suggests that the gentle southwesterly structural plunge may exert greater-than-usual control on deep groundwater flow directions. Reported local well yields are sparse but range from 2 to 25 gpm (Slaughter and Darling, 1962).

2.2 SAPROLITE AND SOIL MANTLE

Natural chemical weathering of the shallow portion of the bedrock, due to percolating water, has chemically altered many of the original rock-forming minerals to clays and other secondary minerals. This has resulted in the development of shallow saprolite (weathered bedrock) and the overlying soil mantle. The thickness of the soil and saprolite is generally 2 to 10 feet, but it varies considerably over short distances. In highly fractured zones, enhanced groundwater storage and movement has accelerated the breakdown of the rock-forming minerals and has caused formation of a thicker saprolitic deposit.

2.3 AQUIFER RECHARGE

Precipitation infiltrating through the soil on site and/or in up-gradient areas is the primary source of aquifer recharge to the on-site supply well. Generally, overlying soil horizons act to absorb and then slowly release infiltrating precipitation. However, in areas where fracture zones have formed, percolating groundwater can reach the water table quickly. A portion of the precipitation percolates downward through the soil mantle and then migrates through narrow, interconnected joints, fractures, faults, and cleavage planes in the bedrock.

2.4 GEOLOGY-CONTROLLED GROUNDWATER FLOW

Generally, bedding plane partings and cross-bedding fracture zones (where present) function as both downward and lateral water conduits. Consequently, such zones receive and transmit water at a rate higher than would otherwise be achievable and, accordingly, are preferential conduits for groundwater flow and contaminant transport.

Despite the bedrock's overall hardness and resistance to erosion, hydraulic permeabilities in bedding planes and fracture zones may be several times greater than in surrounding less-fractured rock. This intrinsic characteristic portends the possibility for the existence of specific zones with higher-than-normal well yields, higher-than-normal groundwater flow velocities and higher-than-normal susceptibility to groundwater contamination.

3.0 WATER QUALITY ASSESSMENT

Slaughter and Darling (1962) reported the groundwater quality as locally variable (iron concentrations range from 0.01 to as much as 0.12 micrograms per liter (mg/l); hardness ranges from 13 to 90 mg/l; and pH ranges from 6.3 to 8.7). ALWI interpreted that the slight reddish colors of the local rock exposures as likely attributable to the trace presence of iron.

At this location, ALWI collected baseline groundwater samples on December 15, 1998, in accordance with the MDE sampling procedures specified in COMAR 26.08.05. ALWI collected the samples from sinks in motel unit bathrooms as specified in COMAR 26.04.01.14. ACHD's laboratory analyzed the samples for those constituents of countywide concern. These included total coliform bacteria as specified in COMAR 26.04.01.11A-C, alkalinity, color, conductance, hardness,

iron, manganese, nitrate-nitrite nitrogen (COMAR 26.04.01.14(4)(a)), nitrite nitrogen (COMAR 26.04.01.14(4)(b)), pH, and total dissolved solids.

The results are included as Appendix A, and suggest potability with respect to the analyses performed. Based on its location at the top of the Inn, the supply appears not to be at risk for surface water influence as defined in the MDE guidance document.

4.0 WHPA DELINEATION

ALWI delineated a WHPA surrounding this site's well using generalized criteria developed by MDE for non-community supplies, as modified by ALWI (with ACHD consent) based on the specific topographic setting of the site. ALWI began by using a fixed radius of 1,000 feet around the well. From this radial area, ALWI then excluded downgradient areas more than 100 feet from the wellhead as well as areas unlikely to contribute recharge to the well based on intervening and/or drainage divides. ALWI excluded steeply-sloping cross-gradient areas.

The resultant delineation is shown on the "Water Plant Information" survey form (Appendix B) and encompasses approximately 60% of the circle (originally 72 acres in size) or 43 acres. Within an assumed 600 gallons per day per acre (gpd/ac) of annualized groundwater recharge (Slaughter and Darling, 1962, Table 37), over 25,000 gallons per day exists within the aquifer beneath this WHPA. In actuality, the modest demand on this well (less than 2,000 gpd) is one full order of magnitude smaller than the available groundwater in the WHPA, lending a high degree of conservatism to this analysis.

Negligible nitrate-nitrogen concentrations were detected in the sample ALWI collected. This obviated the need for a nitrate balance assessment.

5.0 CONTAMINANT THREATS ASSESSMENT

ALWI performed a site reconnaissance on December 15, 1998. During the reconnaissance, local land use conditions were observed with emphasis on the potential use, storage and disposal practices of hazardous materials and petroleum products. Such conditions may have included visual evidence for present or former spills, stained or discolored ground surfaces, stressed vegetation, unusual odors, or visible underground storage tank (UST) facilities. Adjacent and nearby properties were also visually scanned for such evidence from the property and nearby public right-of-ways. Off-site properties were not entered. No interview information was available to corroborate these limited observations.

5.1 POTENTIAL HAZARDS AT THE WELLHEADS

Design, construction and present condition are important factors in determining a well's susceptibility to contamination. However, no well tags were visible. Accordingly, ALWI could not

assess the initial design or present condition of the casing or grout seal. ALWI observed that the top of each well casing terminates in a shallow, non-watertight subsurface vault. This in apparent violation of several provisions[1] within COMAR 26.04.04.07F. Extension of the casing to above natural grade, with appropriate vehicular protection, would provide greater protection against possible contamination.

5.2 Other Local Contamination Risks

Based solely on visual observation and interview information, ALWI identified the following potential sources of contamination within the WHPA: possible remnant surficial and subsurface fuel spills from a fuel oil UST formerly on site[2], possible stormwater infiltration along the wells' casing, salt from parking lot and highway deicing, and the aforementioned risks associated with the wells' vaults.

6.0 CONCLUSION AND RECOMMENDATIONS

ALWI found that the supply is potable relative to the analyses performed. No discharge to groundwater has been confirmed by any of the facilities or practices ALWI observed. Nevertheless, ALWI provides recommendations to assess and mitigate the risk from the following hazards:

1. **Remnant Petroleum from Former UST** – ALWI observed a UST vent at the rear of the main building, indicating that perhaps fuel oil was once used as a source of heat. Based solely on the former on-site UST, ALWI recommends a single round of analytical testing to confirm the absence of typical fuel oil constituents (diesel-range organic hydrocarbons and naphthalene. Periodic monitoring and other corrective actions as necessary should then continue based on the findings.

2. **Subsurface Disposal Facilities** – Older septic tanks of the type likely present may have seams. Though the low nitrate concentrations in groundwater indicate no present release, property ownership interest should embark on a regularly scheduled program of pump-outs. When the septic system needs replacement, the tank should be replaced with a seamless model and no facilities should be relocated uphill or within 100 feet of the well.

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[1] This regulation prohibits vaults, requires pitless adapters, and specifies that the finished height of well casings extend at least 8 inches above natural grade.

[2] Any finding of petroleum-contaminated groundwater must be reported to the MDE Oil Control Program, whether or not coincident with UST removal work. Such a report would open or reopen an Oil Control Program case file and could result in an enforcement action from MDE given the possibility that a remnant UST remains on site. MDE Oil Control Program representatives may order additional sampling, monitoring well drilling, and/or other investigative and remedial measures. ALWI suggests that site ownership interests consult legal counsel before taking (or choosing not to take) any action that could have adverse financial or environmental liability consequences.

3. **Subsurface Well Completion** – The wells should be retrofitted with pitless adapters and casings extended to above-grade. The vaults should be backfilled with inert material with care taken to adhere to casing grouting requirements in so doing. Access for pump repairs and replacements should be maintained as well as, appropriate protection from vehicular collision at the well casings.

4. **Highway and Parking Area Deicing** – Highway and parking area deicing practices may increase a seasonal risk of sodium and chloride contamination. The Maryland State Highway Administration is unlikely to curtail or otherwise change deicing practices. However, consideration should be given to using non-chemical abrasives on the parking lot for deicing to the degree possible. Baseline and bi-annual sampling for sodium and chlorides should be considered.

7.0 SELECTED REFERENCES

Cleaves, Emery T., Jonathan Edwards Jr. and John D. Glaser, 1968. Geologic Map of Maryland: Maryland Geologic Survey, 1:250,000.

MDE Public Drinking Water Program, 1998, Transient Water System Operations Guidance; Guidance For Counties With Delegated Responsibilities (Draft), 45p.

Slaughter, Turbit H. and John M. Darling, 1963, The Water Resources of Allegany and Washington Counties: Maryland Department of Geology, Mines, and Water Resources, Bulletin 24, p. 408.

NONCOMMUNITY WATER SUPPLY SANITARY SURVEY

1. System Name: Continental Motor Inn - Well #1

2. WAS: 47

3. System Information:

Address: 15001 National Highway

Cumberland, Maryland

Phone No.: (301) 729-2201

4. ADC Map/Grid: N/A

5. Tax Map/Plat: N/A

6. Population:

Transient	300
Regular	2
Total	302

7. Property Information:

Owner's Name: King Enterprises

Address: 15001 National Highway

Cumberland, Maryland

Phone No.: (301) 729-2201

8. No. Service Connections:

9. Type of Facility:

Food Service	x
Church	
Campground	
Daycare	
Other (specify)	Hotel

10. Contact Person:

Name: King Enterprises

Phone No. (301) 729-2201

11. Operator:

Name:

Cert. No.

12. Sample History (Has the system had any violations?):

Bacteria: None apparent or reported

Nitrate: None apparent or reported

SURVEY RESULTS

13. Comments on System, Recommendations:

ALWI found that the supply is potable relative to the analyses performed. No discharge to groundwater has been confirmed by any of the facilities or practices ALWI observed. Nevertheless, ALWI provides recommendations to assess and mitigate the risk from the following hazards:

1. **Remnant Petroleum from Former UST** – ALWI observed a UST vent at the rear of the main building, indicating that perhaps fuel oil was once used as a source of heat. Based solely on the former on-site UST, ALWI recommends a single round of analytical testing to confirm the absence of typical fuel oil constituents (diesel-range organic hydrocarbons and naphthalene. Periodic monitoring and other corrective actions as necessary should then continue based on the findings.

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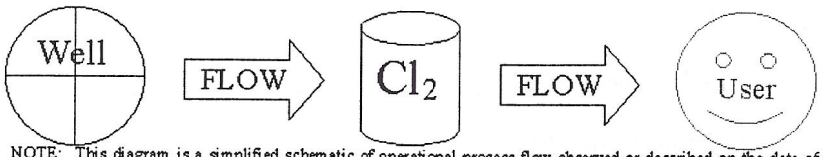
14. Inspected by:	15. Date inspected:	16. System Vulnerability
Mark W. Eisner	12/15/98	Protected _____ Vulnerable Yes (see report)

WATER PLANT INFORMATION

17. Type of Treatment:
(Check all that apply)

Disinfection	
Gas Chlorine:	_____
Sodium Hypochlorite	x
Ultraviolet Radiation	_____
Iron Removal	_____
Nitrate Removal	_____
PH Neutralizer	_____
Other	_____
Unknown	_____

18. System Schematic (Process Flow):



NOTE: This diagram is a simplified schematic of operational process flow observed or described on the date of the reconnaissance. Many water systems possess malfunctioning, disconnected and/or occasionally/regularly-bypassed equipment. Actual treatment processes may differ, therefore, from those shown herein.

19. System Storage:

Ground Storage	_____
Elevated Storage	_____
Hydropneumatic Tank	x
Other	_____

20. Storage Capacity:

Typical Domesitc

21. Untreated water sampling tap?

Yes _____ No x

WELL INFORMATION

22. Well Information:

Tag Number: _____

Year Drilled: _____

Casing Depth: _____

Well Depth: _____

Well Yield: _____

Casing Height: In Pit

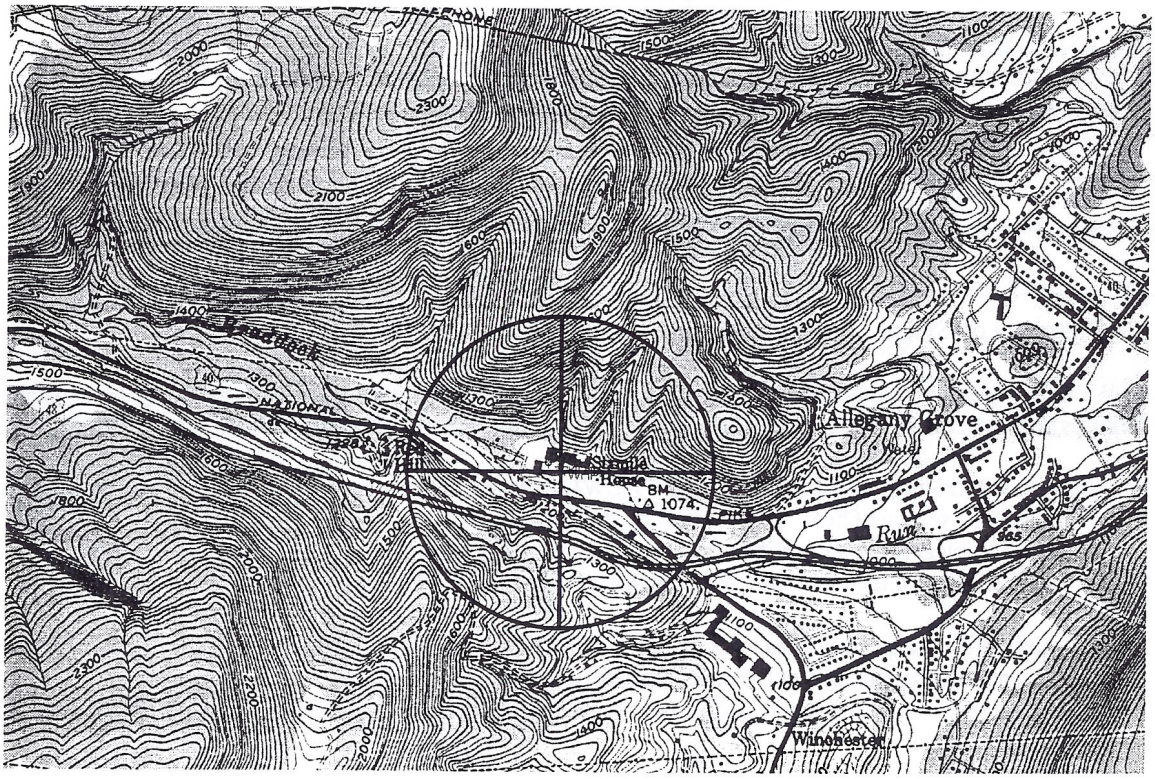
Grout Depth: _____

Pitless Adapter? No

Wiring OK? unknown

Pump OK? unknown

24. Well Location Diagram (1in. = 1250 ft.) with Approximate Distances from Potential Contaminant Sources (i.e. septic, sewer lines, structures, petroleum storage, surface water bodies, etc.):



23. Well Type:

Drilled	x
Driven	_____
Dug	_____

25. Aquifer:
Name: Hampshire/Chemung
GAP #: _____
Confined _____
Unconfined x
Semi-confined _____

26. Quantity Used:

Daily Avg (gpd)	<300
Pumping Rate (gpm)	unknown
Hours run per day	unknown

27. Well Cap:

Type?	_____
Seal Tight?	O.K.
Vented?	O.K.
Screened?	No
Conduit OK?	O.K.

28. Casing Diameter:

2"	_____
4"	_____
6"	x
Other	_____

29. Casing Type:

PVC	_____
Metal	x
Concrete	_____

NONCOMMUNITY WATER SUPPLY SANITARY SURVEY

1. System Name: Continental Motor Inn – Well #2

2. WAS: 48

3. System Information:

Address: 15001 National Highway

Cumberland, Maryland

Phone No.: (301) 729-2201

4. ADC Map/Grid: N/A

5. Tax Map/Plat: N/A

6. Population:

Transient 300
Regular 2
Total 302

7. Property Information:

Owner's Name King Enterprises

Address: 15001 National Highway

Cumberland, Maryland

Phone No. (301) 729-2201

8. No. Service Connections:

9. Type of Facility:

Food Service _____
Church _____
Campground _____
Daycare _____
Other (specify) Hotel

10. Contact Person:

Name: King Enterprises

Phone No. (301) 729-2201

11. Operator:

Name: _____

Cert. No. _____

12. Sample History (Has the system had any violations?):

Bacteria: None apparent or reported

Nitrate: None apparent or reported

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2. **Subsurface Disposal Facilities** – Older septic tanks of the type likely present may have seams. Though the low nitrate concentrations in groundwater indicate no present release, property ownership interest should embark on a regularly scheduled program of pump-outs. When the septic system needs replacement, the tank should be replaced with a seamless model and no facilities should be relocated uphill or within 100 feet of the well.

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14. Inspected by: Mark W. Eisner

15. Date inspected: 12/15/98

16. System Vulnerability
Protected _____ Vulnerable Yes (see report)

WATER PLANT INFORMATION

17. Type of Treatment:
(Check all that apply)

Disinfection	
Gas Chlorine:	_____
Sodium Hypochlorite	x
Ultraviolet Radiation	_____
Iron Removal	_____
Nitrate Removal	_____
PH Neutralizer	_____
Other	_____
Unknown	_____

18. System Schematic (Process Flow):

NOTE: This diagram is a simplified schematic of operational process flow observed or described on the date of the reconnaissance. Many water systems possess malfunctioning, disconnected and/or occasionally/regularly-bypassed equipment. Actual treatment processes may differ, therefore, from those shown herein.

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Ground Storage	_____
Elevated Storage	_____
Hydropneumatic Tank	x
Other	_____

20. Storage Capacity:

Typical Domestic

21. Untreated water sampling tap?

Yes _____ No x

WELL INFORMATION

22. Well Information:

Tag Number: _____

Year Drilled: 1970

Casing Depth: _____

Well Depth: _____

Well Yield: _____

Casing Height: In Pit

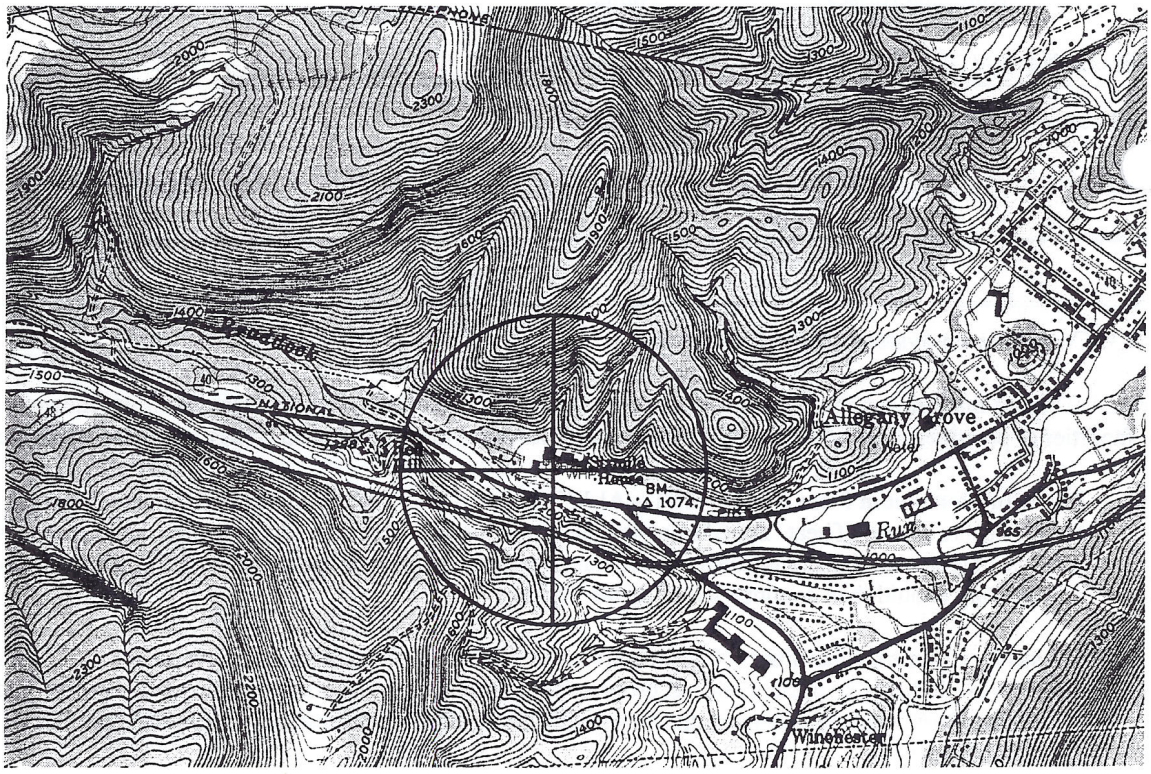
Grout Depth: _____

Pitless Adapter? no

Wiring OK? unknown

Pump OK? unknown

24. Well Location Diagram (1 in. = 1250 ft.) with Approximate Distances from Potential Contaminant Sources (i.e. septic, sewer lines, structures, petroleum storage, surface water bodies, etc.):



23. Well Type:

Drilled	x
Driven	_____
Dug	_____

25. Aquifer:
Name: Hampshire/Chemung
GAP #: _____

Confined	_____
Unconfined	x
Semi-confined	_____

26. Quantity Used:

Daily Avg (gpd)	unknown
Pumping Rate (gpm)	unknown
Hours run per day	unknown

27. Well Cap:

Type?	_____
Seal Tight?	O.K.
Vented?	O.K.
Screened?	No
Conduit OK?	O.K.

28. Casing Diameter:

2"	_____
4"	_____
6"	x
Other	_____

29. Casing Type:

PVC	_____
Metal	x
Concrete	_____